exchangeable cationic sites, with silver cation or copper cation present at some or all of the exchangeable cationic sites. Substantial cation exchange is preferred so that at least half of the cationic sites of the ion exchange zeolite contain a copper or silver cation. In a preferred embodiment, the majority of the cationic sites of the ion-exchanged zeolite contain silver cation. In an even more preferred embodiment, essentially all cationic sites of the ion-exchanged zeolite contain the silver cation.

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Page 11, between lines 20 and 21, please insert the following paragraph:

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The Cu-zeolites of the invention were prepared by ion exchanging with a solution of $CuCl_2$ or $Cu(NO_3)_2$, followed by reduction of Cu^{+2} to Cu^{+1}.

In the claims:

1. (Amended) A method of separating gaseous alkene selected from the group consisting of ethylene, propylene and mixtures thereof, from a gaseous mixture including the alkene and hydrogen sulfide, the method comprising the steps of:

contacting the gaseous mixture with an adsorbent which preferentially adsorbs the alkene, at a selected temperature and pressure, thereby producing a non-adsorbed component and an alkene-rich adsorbed component; the adsorbent comprising a carrier having a surface area, the carrier having a monolayer of a silver compound dispersed on substantially the entire surface area, the silver compound releasably retaining the alkene; and the carrier comprising a plurality of pores having a pore size greater than the effective molecular diameter of the alkene; and

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changing at least one of the pressure and temperature to thereby release the alkene-rich component from the adsorbent;

wherein the adsorbent substantially maintains its adsorbent capacity and preference for the alkene in the presence of the hydrogen sulfide.

11. (Amended) A sulfur tolerant adsorbent for preferential adsorption of gaseous alkene from a gaseous mixture including the alkene and hydrogen sulfide, the adsorbent comprising:

a carrier; and

a silver compound supported on the carrier, wherein the silver compound is a silver salt, and wherein the salt is selected from the group consisting of acetate, benzoate, bromate, chlorate, perchlorate, chlorite, citrate, fluoride, nitrate, nitrite, and sulfate;

and wherein the adsorbent substantially maintains its adsorbent capacity and preference for the alkene in the presence of the hydrogen sulfide.

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15. (Amended) A method for separating a diene from a mixture including the diene and a sulfur compound, the method comprising the step of:

contacting the mixture with an adsorbent which preferentially adsorbs the diene, at a selected temperature and pressure, thereby producing a non-adsorbed component and a diene-rich adsorbed component, wherein the adsorbent comprises an ion-exchanged zeolite selected from the group consisting of zeolite X, zeolite Y, zeolite LSX, and mixtures thereof, the zeolite having exchangeable cationic sites, and a majority of the sites having silver cation or copper cation present, and wherein the preferential adsorption occurs by π-complexation, and further wherein the adsorbent substantially maintains its adsorbent capacity and preference for the diene in the presence of the sulfur compound.

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Please cancel claim 26 without prejudice.

27. (Amended) The method as defined in claim 32 wherein the diene is selected from the group consisting of butadiene, hexadiene, octadiene, and mixtures thereof.

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28. (Amended) The method as defined in claim 27 wherein a selected pressure of preferential adsorption is a first pressure, and a pressure of release is a second pressure less than the first pressure, wherein the first pressure is in a range of about 1 atmosphere to about 35 atmospheres, and wherein the second pressure is in a range of about 0.01 atmosphere to about 5 atmospheres.

29. (Amended) A method of separating gaseous alkene selected from the group consisting of ethylene, propylene and mixtures thereof, from a gaseous mixture including the alkene and a sulfur compound, the method comprising the steps of:

contacting the gaseous mixture with an adsorbent which preferentially adsorbs the alkene, at a selected temperature and pressure, thereby producing a non-adsorbed component and an alkene-rich adsorbed component; the adsorbent comprising a carrier having a surface area, the carrier having a monolayer of a silver compound dispersed on substantially the entire surface area, the silver compound releasably retaining the alkene; and the carrier comprising a plurality of pores having a pore size greater than the effective molecular diameter of the alkene; and

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changing at least one of the pressure and temperature to thereby release the alkene-rich component from the adsorbent;

wherein the adsorbent substantially maintains its adsorbent capacity and preference for the alkene in the presence of the sulfur compound, wherein the sulfur compound is hydrogen sulfide, and wherein the hydrogen sulfide is present in amounts up to about 66 mole%.

30. (Amended) A sulfur tolerant adsorbent for preferential adsorption of gaseous alkene from a gaseous mixture including the alkene and a sulfur compound, the adsorbent comprising:

a carrier; and

a silver compound supported on the carrier, wherein the silver compound is a silver salt, and wherein the salt is selected from the group

consisting of acetate, benzoate, bromate, chlorate, perchlorate, chlorite, citrate, fluoride, nitrate, nitrite, and sulfate;

wherein the carrier has a BET surface area greater than about 50 square meters per gram and up to about 2,000 square meters per gram and comprising a plurality of pores having a pore size greater than about 3 angstroms and up to about 10 microns;

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and wherein the adsorbent substantially maintains its adsorbent capacity and preference for the alkene in the presence of the sulfur compound, wherein the sulfur compound is hydrogen sulfide, and wherein the hydrogen sulfide is present in amounts up to about 66 mole%.

32. (Amended) A method for separating a diene from a mixture including the diene and a sulfur compound, the method comprising the steps of:

contacting the mixture with an adsorbent which preferentially adsorbs the diene at a first temperature, thereby producing a non-adsorbed component and a diene-rich adsorbed component, wherein the adsorbent comprises zeolite A having exchangeable cationic sites, a plurality of the zeolite A sites having an alkali metal cation or an alkaline earth metal cation present; and

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releasing the diene-rich adsorbed component from the adsorbent by elevating the temperature to a second temperature which ranges between about 70°C and about 120°C;

wherein the adsorbent substantially maintains its adsorbent capacity and preference for the diene in the presence of the sulfur compound, wherein the sulfur compound is hydrogen sulfide, and wherein the hydrogen sulfide is present in amounts up to about 66 mole%.

Please add the following new claims:

33. The sulfur tolerant adsorbent as defined in claim 11 wherein the carrier has a BET surface area greater than about 50 square meters per gram and up to about 2,000 square meters per gram and comprising a plurality of pores having a p re size greater than about 3 angstroms and up to about 10 microns.

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34. A method for separating a diene from a mixture including the diene and hydrogen sulfide, the method comprising the step of:

contacting the mixture with an adsorbent which preferentially adsorbs the diene, at a selected temperature and pressure, thereby producing a non-adsorbed component and a diene-rich adsorbed component, wherein the adsorbent comprises an ion-exchanged zeolite selected from the group consisting of zeolite X, zeolite Y, zeolite LSX, and mixtures thereof, the zeolite having exchangeable cationic sites, and at least some of the sites having silver cation or copper cation present, and wherein the preferential adsorption occurs by π-complexation, and further wherein the adsorbent substantially maintains its adsorbent capacity and preference for the diene in the presence of the hydrogen sulfide.

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35. The method as defined in claim 34 wherein the diene is selected from the group consisting of butadiene, hexadiene, octadiene and mixtures thereof, and wherein the method further comprises the step of changing at least one of the pressure and temperature to thereby release the diene-rich component from the adsorbent.

36. The method as defined in claim 34 wherein the diene is 1,3-butadiene, and wherein the mixture includes 1,3-butadiene and at least one other C_4 unsaturated compound.

37. The method as defined in claim 34 wherein a majority of the cationic sites of the ion-exchanged zeolite contain the silver cation.

38. The method as defined in claim 34 wherein a majority of the cationic sites of the ion-exchanged zeolite contain the copper cation.

39. The method as defined in claim 34 wherein the mixture comprises at least one mono-olefin having as many carbon atoms as the diene,

wherein the diene is selected from the group consisting of butadiene, hexadiene, octadiene, and mixtures thereof; and wherein the mono-olefin is selected from the group consisting of butene, hexene, octene, and mixtures thereof.

40. The method as defined in claim 39 wherein the mono-olefin is butene and the diene is butadiene.

41. The method as defined in claim 39 wherein the mixture comprises the mono-olefin in a gaseous state and saturated with the diene.

42. The method as defined in claim 34 wherein essentially all cationic sites of the ion-exchanged zeolite contain the silver cation.

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43. The method as defined in claim 35 wherein the selected pressure of preferential adsorption is a first pressure, and the pressure of release is a second pressure less than the first pressure, wherein the first pressure is in a range of about 1 atmosphere to about 35 atmospheres, and wherein the second pressure is in a range of about 0.01 atmosphere to about 5 atmospheres.

44. The method as defined in claim 35 wherein the selected temperature of preferential adsorption is a first temperature, and the temperature of release is a second temperature greater than the first temperature, wherein the first temperature is in a range of about 0°C to about 150°C, and wherein the second temperature is in a range of about 70°C to about 250°C.

45. The method as defined in claim 34 wherein the at least some of the sites have silver cation present.

46. The method as defined in claim 34 wherein the at least some of the sites have copper cation present.

47. The method as defined in claim 34 wherein essentially all cationic sites of the ion-exchanged zeolite contain the copper cation.

48. A method for separating a diene from a mixture including the diene and hydrogen sulfide, wherein the diene is selected from the group consisting of butadiene, hexadiene, octadiene and mixtures thereof, wherein the mixture comprises at least one mono-olefin having as many carbon atoms as the diene, and wherein the mono-olefin is selected from the group consisting of butene, hexene, octene, and mixtures thereof, the method comprising the steps of:

contacting the mixture with an adsorbent which preferentially adsorbs the diene, at a selected temperature and pressure, thereby producing a non-adsorbed component and a diene-rich adsorbed component, wherein the adsorbent comprises an ion-exchanged zeolite selected from the group consisting of zeolite X, zeolite Y, zeolite LSX, and mixtures thereof, the zeolite having exchangeable cationic sites, and at least some of the sites having silver cation or copper cation present, and wherein the preferential adsorption occurs by π-complexation, and further wherein the adsorbent substantially maintains its adsorbent capacity and preference for the diene in the presence of the hydrogen sulfide;

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changing at least one of the pressure and temperature to thereby release the diene-rich component from the adsorbent, wherein the selected pressure of preferential adsorption is a first pressure, and the pressure of release is a second pressure less than the first pressure, wherein the first pressure is in a range of about 1 atmosphere to about 35 atmospheres, and wherein the second pressure is in a range of about 0.01 atmosphere to about 5 atmospheres;

and wherein the selected temperature of preferential adsorption is a first temperature, and the temperature of release is a second temperature greater than the first temperature, wherein the first temperature is in a range of about O°C to about 150°C, and wherein the second temperature is in a range of about 70°C to about 250°C.

49. The method as defined in claim 48 wherein the mono-olefin is butene and the diene is butadiene.

50. The method as defined in claim 48 wherein the mixture comprises the mono-olefin in a gaseous state and saturated with the diene.

51. The method as defined in claim 48 wherein a majority of the sites have silver cation present.

52. The method as defined in claim 48 wherein a majority of the sites have copper cation present.

53. The method as defined in claim 48 wherein essentially all cationic sites of the ion-exchanged zeolite contain the copper cation.

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54. The method as defined in claim 48 wherein essentially all cationic sites of the ion-exchanged zeolite contain the silver cation.

55. A sulfur tolerant adsorbent for preferential adsorption of gaseous diene from a gaseous mixture including the diene and hydrogen sulfide, the adsorbent comprising:

an ion-exchanged zeolite selected from the group consisting of zeolite X, zeolite Y, zeolite LSX, and mixtures thereof, the zeolite having exchangeable cationic sites, and at ~~least some~~ of the sites having silver cation or copper cation present, wherein the preferential adsorption occurs by π-complexation; and

wherein the adsorbent substantially maintains its adsorbent capacity and preference for the diene in the presence of the hydrogen sulfide.

56. The sulfur tolerant adsorbent as defined in claim 55 wherein the diene is selected from the group consisting of butadiene, hexadiene, octadiene and mixtures thereof.

57. The sulfur tolerant adsorbent as defined in claim 55 wherein the diene is 1,3-butadiene, and wherein the mixture includes 1,3-butadiene and at least one other C_4 unsaturated compound.

58. The sulfur tolerant adsorbent as defined in claim 55 wherein a majority of the cationic sites of the ion-exchanged zeolite contain the silver cation.

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59. The sulfur tolerant adsorbent as defined in claim 55 wherein a majority of the cationic sites of the ion-exchanged zeolite contain the copper cation.

60. The sulfur tolerant adsorbent as defined in claim 55 wherein essentially all cationic sites of the ion-exchanged zeolite contain the silver cation.

61. The method as defined in claim 55 wherein essentially all cationic sites of the ion-exchanged zeolite contain the copper cation.

62. The sulfur tolerant adsorbent as defined in claim 55 wherein the mixture comprises at least one mono-olefin having as many carbon atoms as the diene, wherein the diene is selected from the group consisting of butadiene, hexadiene, octadiene, and mixtures thereof; and wherein the mono-olefin is selected from the group consisting of butene, hexene, octene, and mixtures thereof.

63. The sulfur tolerant adsorbent as defined in claim 62 wherein the mono-olefin is butene and the diene is butadiene.

64. The method as defined in claim 55 wherein the hydrogen sulfide is ~~present in amounts up to ab ut 66 mole%.~~

65. The method as defined in claim 1 wherein the gaseous mixture is contained in a conventional cracked gas stream before any desulfurizing distillation steps.